20

METHODOLOGICAL ISSUES IN THE CONSTRUCTION OF COMPOSITE INDICES: A CASE STUDY OF THE HUMAN DEVELOPMENT INDEX

Mark McGillivray, Farhad Noorbakhsh and Beris Gwynne

Abstract. This chapter looks at a number of methodological issues relating to the construction of composite indices. It does so by looking at the Human Development Index (HDI), one of the most widely used and arguably best known achieved national composite human well-being index. The challenges faced in constructing the HDI are generic to composite indices in general. After providing an overview of the index and its scores for various countries, this chapter provides a critical evaluation of the HDI. Among the issues considered are the choice of components, index structure, weighting of individual components, transformation of constituent variables and correlations among components. One of the main points made in the chapter is that while there is a need to ensure that the HDI is comparable across countries and over time, there is also a need to ensure that it is relevant to current circumstances, both global and local. The combining of indicators of so-called objective well-being, like the HDI, with measures of subjective well-being is also considered.

1. Introduction

The Human Development Index (HDI) first appeared in the UNDP Human Development Report 1990 (UNDP, 1990). The HDI is widely recognised as not only an attempt to provide new information on national well-being achievement, but to shift development thinking back to core values, away from what the UNDP and many others saw as an excessive focus on income per capita as a well-being measure. Combining indicators of longevity, educational achievement and purchasing power, the HDI has subsequently become one of the best known and most comprehensively reported composite well-being measures. HDI data have been published annually since 1990, with index values now being available for more than 170 countries. For many countries HDI values are available as from 1960. Researchers and policymakers alike have made extensive use of the index, despite the many shortcomings that

have been well-documented in what is now a rather large literature on the HDI. The HDI has not only been extensively used, but extensively reviewed as well. Reviews of the HDI include Acharya and Wall (1994), Cahill (2002, 2005), Gormely (1995), Hicks (1997), Ivanova et al. (1998), Kelley (1991), Lüchters and Menkhoff (1996, 2000), McGillivray (1991), McGillivray and Noorbakhsh (2004), McGillivray and White (1993, 1994), Morse (2003), Murray (1991), Neumayer (2001), Noorbakhsh (1998a, 1998b, 2002) and Sagar and Najam (1998).

This chapter provides a critical evaluation of the HDI. Rather than focusing on the many positive contributions of the HDI, chief among them the effective conveyance of the message that there is more to well-being than achievement in per capita income alone, the chapter looks at challenges involved in constructing a composite well-being index, drawing on the many reviews of the HDI and related indices.[1] The current chapter does not do justice to this literature as it looks at a narrower range of issues, nor does it dwell on the many useful revisions to the HDI it proposes. It does, however, examine a number of core issues not only relevant to the HDI and other well-being indices but to the design of composite indices in general. For this reason the examination of the HDI is essentially a case study of issues relating to the construction of composite indices per se. The scope of this chapter, therefore, goes well beyond the HDI.

The chapter consists of four additional sections. Section 2 briefly examines HDI profiles for selected countries, highlighting those of small island states. Section 3 deals with the core issues in the design of the HDI. Section 4 looks at the relevance of the HDI for small island states. Section 5 concludes the chapter.

2. HDI Profiles

HDI values for 177 countries were reported in the Human Development Report 2005 (UNDP, 2005). These values are for the year 2003. As in all

[1] It should be noted that the HDI is by no means the only composite well-being index. Nor is it the first. As Booysen (2002) points out, at least 20 composite indices similar in varying degrees to the HDI have received international attention in the last four decades. These indices include the forerunner to the HDI, the Physical Quality of Life Index (PQLI) (Morris, 1979), together with the United Nations Research Institute for Social Development (UNRISD) Level of Living Index (LLI) (Drewnowski and Scott, 1966), General Index of Development (GID) (McGranahan et al., 1972), and Socioeconomic Development Index (SID) (UNRISD, 1970), the Combined Quality of Life Indices (CQLI) (Diener, 1995), and the Human Suffering Index (HSI) (Camp and Speidel, 1987; Hess, 1989; Tilak, 1992). Also included are the Gender-related Development Index, Gender Empowerment Measure and the Human Poverty Index, indices proposed by the UNDP in subsequent Human Development Reports (UNDP, 1995).

Reports, the theoretical maximum value is 100 while the theoretical minimum value is zero. 2003 HDI values for Malta and all countries classified by the United Nations as Small Island Developing States (SIDS), for which requisite data are available are shown in Table 1. Also shown for comparison are HDI values for the top five and bottom five ranked countries worldwide in 2003. International rankings are also shown. The data on which the HDI values shown in Table 1 are based are given in the Appendix.

HDI values for 32 small island states are shown. Twenty of these countries have values above the world value. The top five countries worldwide all have HDI values above 0.900. Of all the small island states listed in Table 1, only Singapore has a HDI value above that threshold. Haiti and Guinea-Bissau are among the poorest countries in the world according to the HDI. With a ranking of 172, Guinea-Bissau is actually the sixth poorest country according to the HDI. Overall, there is quite a degree of diversity of HDI values among the small island states.

Table 1
Human Development Index (2003)

Country	Value	Rank	Country	Value	Rank
Small Island Developing States					
Singapore	0.907	25	St Vincent	0.755	87
Barbados	0.878	30	Belize	0.753	91
Malta	0.867	32	Fiji	0.752	92
St Kitts/Nevis	0.834	49	Dominican Rep.	0.749	95
Bahamas	0.832	50	Maldives	0.745	96
Seychelles	0.821	51	Jamaica	0.738	98
Cuba	0.817	52	Cape Verde	0.721	105
Tonga	0.810	54	Guyana	0.720	107
Trinidad & Tobago	0.801	57	Vanuatu	0.659	118
Antigua & Barbuda	0.797	60	São Tomé & Príncipe	0.604	126
Mauritius	0.791	65	Solomon Islands	0.594	128
Grenada	0.787	66	Comoros	0.547	132
Dominica	0.783	70	Papua New Guinea	0.523	137
Samoa (Western)	0.776	74	Timor-Leste	0.513	140
St Lucia	0.772	76	Haiti	0.475	153
Suriname	0.755	86	Guinea-Bissau	0.348	172
Selected Other Countries					
Norway	0.963	1	Chad	0.341	173
Iceland	0.956	2	Mali	0.333	174
Australia	0.955	3	Burkina Faso	0.317	175
Luxembourg	0.949	4	Sierra Leone	0.298	176
Canada	0.949	5	Niger	0.281	177

Source: UNDP (2005)

The UNDP uses high, medium and low human development categories. A high human development (HHD) country has a HDI value of 0.800 or greater. Medium human development (MHD) countries are those with HDI scores between 0.799 and 0.500 and low human development countries have scores of less than 0.500. Of the 32 small island states listed in Table 1, 9 are HHDs, 21 are MHDs and 2 are LHDs.

3. HDI: Core Design Issues

Choice of Components

The HDI incorporates three dimensions or components: health, education and income or purchasing power. The UNDP has, in many of its Human Development Reports sought to provide a solid conceptual basis for the HDI by linking the index to Amartya Sen's notion of capabilities (Sen 1985, 1990, 1993, among many other works). The Human Development Report 1995, for instance, noted that:

> "The basis for selection of critical dimensions, and the indicators that make up the human development index, is identifying basic capabilities that one must have to participate in and contribute to society. These include the ability to lead a long and healthy life, the ability to be knowledgeable and the ability to have access to the resources needed for a decent standard of living." (UNDP, 1995: 18)

The three components of the HDI are intended to reflect these three (cap)abilities. The UNDP has also sought to provide a precise definition of human development, which is analogous to human well-being, linking it to the design of the HDI. The first Human Development Report noted:

> "Human development is a process of enlarging people's choices. The most critical ones are to lead a long and healthy life, to be educated and to enjoy a decent standard of living." (UNDP, 1990: 10)

The selection of components is subject to a number of criticisms. Irrespective of how elegantly and emphatically the justifications for the choices of components might be articulated, in the final analysis the selection remains ad hoc. Hicks and Streeten (1979: 576) noted that in the case of the PQLI most serious scholars find it difficult to accept the results of a composite development index without stronger theoretical foundation. What is ultimately required, it would seem, is the known functional form of a well-being production function. This is acknowledged in the *Human Development Report 1993*, which observed

that in an ideal world the HDI's design would be guided by a meta production function for human development (UNDP, 1993: 109). Unfortunately the precise form of this function is not known.

A related issue concerns the concept of universalism. As Anand and Sen (2000) observe, universalism is the recognition of a shared claim of every person to the elementary or basic capabilities required to lead a worthwhile life. This is in itself a defence of many composite indices, including the HDI, as few would deny that health, education and purchasing power are not universal elementary capabilities, and as such essential elements of a well-being vector. If so then it is appropriate to measure well-being achievement among countries on the basis of these variables. But while universalism offers a justification for inclusion of certain variables in composite indices, it also provides a telling criticism for the exclusion of others as there are indeed many other elementary, universal capabilities or values that ought, in principle, to be included in them.

One such value is basic human security. While human security can be variously defined, not being the victim of violence of physical or other intimidation would appear to be a universal value. It is clearly the case that the likelihood of physical violence, in particular, will significantly constrain an individual's participation and contribution to the society in which they live. Any recent visitor to one small island state—Papua New Guinea—will attest to this point. Yet it is one which has received little attention in discussions centred on the HDI and other composite indices.

Another possible universal value is political freedoms or rights. Dasgupta (1990) criticised the HDI on these grounds, claiming that "it is quite incomplete; as it is oblivious to what is commonplace to call human rights" (UNDP, 1993: 105). On a similar vein, Hopkins (1991: 1471), in a critique of the HDI, observes that the index value would be high for someone living a long time with access to library in a prison. Streeten (1995), however, argues against the inclusion of human rights variables on a number of grounds, including the volatility of such variables, which if included in an index could cause its values to drop from one year to the next even though the other component variables might not have changed, and subjectivity in the measurement of these variables. One can question the first of these grounds; if the value of a variable drops, and it is a valid measure of well-being, then it is entirely appropriate that the index value, *ceteris paribus*, drops. That is exactly what should happen.

The UNDP also used the same argument to defend the choice of components in the first Human Development Report, published in 1990, and repeated this argument in the 1993 Report. One suspects, however, that one important reason why human rights and many other variables

are not included in composite indices is their limited cross-country availability, and the related desire to report index values for as many countries as possible. Indeed, this would appear to have heavily guided the general choice of variables included in composite indices.

While not challenging the universal nature of the HDI, Anand and Sen (1992) float the idea of different indicators for the capabilities that the index attempts to capture. Specifically, Anand and Sen consider different indicators for the low, medium and high human development categories reported in the Human Development Reports. They propose, for example, combining child mortality and life expectancy as the long and healthy life HDI component for middle human development group countries. For high human development countries, they propose using a gini-corrected mean national income instead of PPP GDP per capita (UNDP, 1993).

Similarly, the CQLI consists of two main components, which in turn contain sub-component variables: a basic quality of life index and an advanced quality of life index. Both contain seven variables, chosen to discriminate between developing and industrial countries in terms of the same general well-being domains (Diener, 1995). Crucial here is the distinction between the choice of components and the choice of variables used to represent or measure achievement in these components.

Another common criticism of the choice of variables in composite indices is that measures of the means by which well-being is achieved are combined with measures of well-being ends. In the cases of the PQLI and HDI, for example, life expectancy and adult literacy might be considered as ends whereas school enrolment would appear to be a means. Morris (1979), in defence of the PQLI, argued that indices based on ends alone lack relevance on the grounds that policy interventions are designed on the basis of means. Veenhoven (1996) argues against the use of means variables, arguing that ends variables are better suited to evaluate goals or outcomes of policy, and against the combination of means and ends variables as this lacks theoretical justification.

Structure and Weights

Having selected the components, the next step in the design of any composite index is to formulate a way of combining them into a single number. Put differently, the structure of the index needs to be determined. The HDI combines its three components in the following manner:

$$HDI_i = \omega_1 H_{1,i} + \omega_2 H_{2,i} + \omega_3 H_{3,i} \qquad i = 1,\ldots,n \qquad (1)$$

where $H_{1,i}$, $H_{2,i}$ and $H_{3,i}$ are indices of health, education and income,

respectively, in country i and ω_1, ω_2 and ω_3 are weights, each set at one-third. These indicators are intended to measure the respective observed achievements of country i in each of the above-mentioned dimensions. The chosen indicators for health and income are years of life expectancy and the logarithm of GDP per capita measured in PPP dollars, respectively. The education index is constructed using the adult literacy rate and the gross school enrolment rate. It may be written as follows:

$$H_{2,i} = v_1 h_{2,1,i} + v_2 h_{2,2,i} \quad (2)$$

where $h_{2,1,i}$ and $h_{2,2,i}$ are the adult literacy rate and the gross school enrolment rate, respectively, and v_1 and v_2 are weights set at two thirds and one-third respectively (UNDP, 2004).

The HDI is like many other composite indices, in that its values are obtained by summing or adding together components. But this rests on some crucial assumptions, implicit or otherwise. One assumption is that each component has its own intrinsic worth, with health being good for health's sake and so on. Another is that each component is independent of the others, without any one component having instrumental value with respect to another. Both assumptions are questionable with respect to the HDI. A case can be made for health and education having intrinsic worth, but can it also be made for income? One would think not. This very point is acknowledged in early HDIs, in which the UNDP argued that income should not be seen as an end in its own right, merely as a means to an end (UNDP, 1990). This is consistent with many writings in the well-being literature. Amartya Sen, for instance, who was involved in devising the HDI, points out that what really matters it is not the level of income per capita per se but how it is spent (Sen, 1985). Similarly, it would appear just as difficult to make a case for the non-instrumentality of the other HDI components. Each would appear to be interdependent.

Such interdependence needs to be factored into the construction of the index. One way is to combine the variables in question multiplicatively, rather than purely additively. How to handle the preceding issue in the context of the HDI or similar indices is not clear. If health and education were the only dimensions that matter then there would appear to be a case for not including income, for instance. But since other dimensions do matter, income simply proxies those dimensions not included in the index. But what is reasonably unambiguous is that if the chosen dimensions or components have intrinsic value only, adding them together to form an index is acceptable.

The weights attached to the components have been closely scrutinised. The setting of weights is ideally something that should be guided by

good theory. In an ideal world the HDI's design would be guided by a meta production function for human development. In the absence of such a function and agreement regarding what the weights ought to be, the UNDP invoked Occam's Razor and gave each component an equal weighting. Clearly, these weights are not correct. But in the absence of knowledge of what they should actually be, they are probably the least-worst alternative.

Variable Transformations

It was mentioned above that there is a crucial distinction between a component and the variable on which it is based. Most component indices combine variables that are measured in different scales. Two of the HDI's variables, as mentioned, are adult literacy and PPP GDP per capita. Adult literacy is percentage and as such has a maximum value of 100. PPP GDP has no such upper limit, and current values range from $580 to $61,190 (UNDP, 2004). Scale equivalence is thus an issue. It needs to be achieved for each index component otherwise the index will be too heavily influenced by the variable with the largest scale.

In computing HDI values the UNDP achieves scale equivalence by standardising or normalising all variables within the range of zero and one hundred. This is important as it achieves scale equivalence. If country i reaches a predetermined theoretical maximum for any one of the indicators, its corresponding indicator value is scaled to one hundred. Alternatively, if that country reaches a predetermined theoretical minimum for any one of the indicators, its corresponding indicator value is scaled to zero. The theoretical maxima and minima are described by the UNDP as upper and lower "goalposts", respectively. The former are set at "limits of what can be expected to be achieved within the next 30 years", while the latter are values "observed historically, going back about 30 years", respectively (UNDP, 1994: 92). The minimum values of life expectancy, both education variables and PPP GDP per capita are 25 years, zero percent and $100, respectively. The corresponding maxima are 85 years, 100 percent and $40,000, respectively (UNDP, 2004).

These values have been fixed since 1994. Prior to that year, the UNDP simply used observed or actual maxima or minima to scale each variable. To this extent it followed the design of the PQLI. This approach attracted criticism on the grounds that a country could over time achieve improvements in each index component but experience a decline in the aggregate value of its index (McGillivray and White, 1992). Such a decline occurs if the maximum and minimum values used to scale each variable increase by a larger margin. As a result the HDI values were not comparable over time. However, as McGillivray and Noorbakhsh (2004)

point out, this need not be a bad thing if the purpose of the index is to capture an element of relative well-being achievement. If one country is not progressing as quickly as another it might well be appropriate that its well-being index declines over time. McGillivray and Noorbakhsh also provide a caution regarding the scale equivalence procedure, noting that the procedure adopted for the HDI actually introduces an unintended implicit weighting scheme that operates independently and in conflict with the explicit weights employed by the index.

Another variable transformation feature of the HDI worth mentioning concerns PPP GDP per capita. It is generally accepted that there are diminishing returns to the conversion of income into well-being. Successive increases in income might increase well-being, but by increasingly smaller amounts. This is the rationale behind the HDI's use of the logarithm of income. The extent of diminishing returns that needs to be imposed is not at all clear, however, and has not been resolved in policy and research circles. More generally, if there is a case for discounting income due to diminishing returns there might be also be case for discounting other well-being index components on the same grounds. Noorbakhsh (1998a) considered this issue with respect to the educational attainment component of the HDI. This is a general issue in the construction of composite indices, and one that needs careful consideration.

Correlations among Components and Related Variables

Some composite well-being indices are a response to the perceived inadequacies of income per capita as a measure of well-being; they are an attempt to more fully capture empirically the assumed vitality or complexity of the human well-being concept. This is not to say that income might not be an important determinant of well-being, but simply that there is more to well-being than income alone. The HDI is such a response, being an attempt to shed more light on other aspects of human development than income per capita alone (Noorbakhsh, 1998a).

The UNDP made much of this point in early Human Development Reports. For instance, in the 1990 report it is noted that:

> "Human development is a process of enlarging people's choices. In principle, these choices can be infinite and change over time. ... income is clearly one option that people would like to have, albeit an important one. But it is not the sum total of their lives." (UNDP, 1990: 10, Box 1.1)

Correspondingly, the UNDP went on to claim that the HDI "ranks countries very differently to GNP per capita" and that "the reason is that GNP per capita is only one of life's many dimensions" (UNDP, 1990: 14).

A number of studies have looked at correlations between the HDI and income per capita, reporting zero- and rank-order correlation coefficients. Similar exercises have been conducted using the PQLI. Larson and Wilford (1979) looked at the correlation between the PQLI and GNP per capita for a sample of 150 countries, reporting zero- and rank-order coefficients of 0.496 and 0.766, respectively. On the basis of these coefficients it was concluded that the PQLI was redundant, on the grounds that it "does not provide any essential information for ranking countries other than that already provided by GNP per capita" (Larson and Wilford, 1979: 583). McGillivray (1991) conducted a similar exercise for the 1990 version of the HDI, reporting for a sample of 119 countries with zero- and rank-order correlation coefficients between the HDI and the logarithm of GNP per capita of 0.859 and 0.889. McGillivray (1991: 1467) also concluded that the HDI for many country groups was empirically redundant, in that it largely provides us with little more information regarding inter-country well-being levels than the traditional indicator, GNP per capita, alone can provide.

A fundamental weakness with these studies is that it is not entirely clear what extent of statistical association deems a new indicator empirically redundant with respect to a pre-existing one. McGillivray and White (1992, 1993) and Cahill (2004) address this point. The former study specifies explicit thresholds to differentiate between redundancy and non-redundancy. Two thresholds are specified—correlation coefficients of 0.90 and 0.70—and hence tests were performed to determine whether the coefficients between the HDI and income per capita are significantly less than these thresholds. The conclusion was that both the 1990 and 1991 HDIs were redundant according to both thresholds. Cahill repeated this exercise for the 2001 HDI, drawing the same conclusion. While these two studies are empirically superior to their predecessors, the thresholds they specify are of course arbitrary. Nor do they deny the non-empirical contribution of the HDI, as outlined above.

A related and arguably far more important issue, if one retains the sorts of indicators used in indices such as the HDI and PQLI, is the correlations between the individual components and also between individual components and the indices as a whole. Larson and Wilford (1979), McGillivray (1991) and McGillivray and White (1992, 1993) also consider this issue, showing that these correlations are very high, with zero- and rank-order coefficients often being above 0.90.

The consequence of this is that basing either the PQLI or the HDI on any one of its component variables yields very similar insights to inter-country well-being when compared to the composite indices. The case for forming a composite indicator is weakened significantly if any one

of its components provides roughly the same information as that indicator. High correlations between components are relevant to weighting schemes. Even if we had sufficient information or an accepted procedure to assign differential weights the exercise may be fruitless if these correlations are high.

Table 2 reinforces this point. It reports correlation coefficients between the 2002 HDI and 12 versions of that index with different component weights. The weights of the first index version have been obtained by the principal components method. The weights are similar in value, reflecting the high correlations between components reported in Table 2. The remaining 11 HDI versions have been obtained from various arbitrary combinations of weights.

Table 2
HDI with Alternative Weights

HDI Re-weight	Correlation coefficient Pearson (zero-order)	Spearman (rank-order)
$HDI_i = 0.93LE_i + 0.91EA_i + 0.93Y_i$	0.935	0.941
$HDI_i = 0.4LE_i + 0.0EA_i + 0.6Y_i$	0.974	0.977
$HDI_i = 0.2LE_i + 0.8EA_i + 0.0Y_i$	0.954	0.935
$HDI_i = 0.6LE_i + 0.4EA_i + 0.0Y_i$	0.979	0.970
$HDI_i = 0.4LE_i + 0.6EA_i + 0.0Y_i$	0.977	0.961
$HDI_i = 0.8LE_i + 0.2EA_i + 0.0Y_i$	0.961	0.963
$HDI_i = 0.2LE_i + 0.6EA_i + 0.2Y_i$	0.985	0.979
$HDI_i = 0.2LE_i + 0.4EA_i + 0.4Y_i$	0.997	0.996
$HDI_i = 0.2LE_i + 0.2EA_i + 0.6Y_i$	0.987	0.986
$HDI_i = 0.0LE_i + 0.2EA_i + 0.8Y_i$	0.960	0.961
$HDI_i = 0.0LE_i + 0.8EA_i + 0.2Y_i$	0.953	0.946
$HDI_i = 0.2LE_i + 0.0EA_i + 0.8Y_i$	0.957	0.977

Source: McGillivray and Noorbakhsh (2004).
Legend: LE = Life Expectancy; EA = Educational Attainment; Y = Income

The weights vary from zero to 0.8 and as such are very different to those used by the UNDP to calculate the HDI. Each combination sums to one, as is the case with the UNDP HDI. Yet the correlation coefficients are all close to one. Cahill (2004) provides a detailed elaboration of this point.

.

4. The HDI and Small Island States

Is the HDI valid for small island states? This question can be rephrased as: are small states different? Gatt (2005) considers this question for

countries with a population of 1.5 million or less. Gatt compellingly argues that small countries are highly economically vulnerable, being exposed to shocks outside their control. Noting that this is not reflected in the HDI, Gatt calls for better consideration of vulnerability issues in the measurement of human development. Gatt's views are broadly similar to those expressed in a number of HDI critiques. Many studies argue, for instance, that sustainability needs to be factored into the HDI and other well-being indices (Neumayer, 2004).

While these studies make many good points, it needs to be recognised that the HDI is an achieved well-being indicator. There are many factors that it fails to consider, but criticism on these grounds can be akin to criticising an orange for being an apple. The issue is not whether a particular factor causes or is associated with well-being. It is whether that factor is constituent of well-being. What we need to ask, therefore, is whether different factors are constituent of well-being in small island states. But before turning to this issue an operational difficulty needs to be noted. The HDI is primarily intended to provide comprehensive international assessments of achieved well-being. Thus while there is a need to ensure that the HDI is comparable across countries and over time, there is also a need to ensure that it is relevant to current circumstances, both global and local. The use of supposedly universal well-being components is an attempt to address this issue. Thus the issue of having a locally or nationally relevant HDI would seem to turn on supplementing the HDI with additional variables, together with looking at different weights. What this would result in is a universal HDI, on which cross-country comparisons are based, and local HDIs, on which county-specific judgments are based. The HDI in part recognises this issue, through the preparation of national, country or region specific, Human Development Reports. But these reports tend to utilise the universal HDI outlined above.

So what might a small island state HDI look like? Let us speculate. Anecdotally there is evidence to suggest that income is not so important in these states, or not as important as elsewhere. This is an argument for giving income a much lower weight in an HDI for these countries. But it might also be a case for introducing happiness scores (now increasingly available) into an HDI. The argument for this is that there is a certain pleasantness to life in small islands that reflects their special circumstances, which is not easily measured by objective indicators and not easily predicted by them either. There is a further argument that this rather pleasant life can easily be disturbed. Happiness scores, which are based on self-assessments of life fulfilment, might capture this. But how one incorporates happiness into a well-being index like the HDI is not obvious. One possibility would be to simply multiply HDI scores by happiness

scores, after some appropriate adjustments are made to the latter. The rationale for this is that being able to enjoy or achieve human development (traditionally measured) is contingent upon happiness.

5. Conclusion

The Human Development Index (HDI) is one of the most widely-used and arguably best-known achieved national composite human well-being index. After providing an overview of the index and its scores for various countries, this chapter provided a critical evaluation of the HDI. Among the issues considered were the choice of components, structure, weighting of individual components, transformation of constituent variables and correlations among components. One of the main points made in the chapter was that while there is a need to ensure that the HDI is comparable across countries and over time, there is also a need to ensure that it is relevant to current circumstances, both global and local. The combining of indicators of so-called objective well-being, like the HDI, with measures of subjective well-being was also considered in the context of small island states.

References

Acharya, A. and Wall, H. J. (1994). "An Evaluation of the United Nations' Human Development Index," *Journal of Economic and Social Development*, Vol. 20(1): 51–65.

Anand, S. and Sen, A. (1992). "Human Development Index: Methodology and Measurement", background paper prepared for the *Human Development Report 1993*. New York: United Nations Development Programme.

Anand, S. and Sen, A. (2000). "Human Development and Economic Sustainability," *World Development*, Vol. 28(12): 2029–2049.

Booysen, F. (2002). "An Overview and Evaluation of Composite Indices of Development," *Social Indicators Research*, Vol. 59(2): 115–151.

Cahill, M. (2002). "Diminishing Returns to GDP and the Human Development Index," *Applied Economics Letters*, Vol. 9(13): 885–887.

Cahill, M (2005). "Is the Human Development Index Redundant?" *Eastern Economic Journal*, Vol. 31: 1-5.

Camp, S.L. and Speidel, J.J. (1987). *The International Human Suffering Index*. Washington: Population Crisis Committee.

Dasgupta, P. (1990) "Well-being in Poor Countries," *Economic and Political Weekly*, 4 August: 1713–20.

Diener, E. (1995). "A Value-based Index for Measuring National Quality of Life," *Social Indicators Research*, Vol. 36: 107–27.

Drewnowski, J. and Scott, W. (1966). "The Level of Living Index." *Report No. 4.* Geneva: United Nations Research Institute for Social Development,

Gatt, E. (2005). "The Human Development Index and Small States," *Bank of Valletta Review*, No. 32: 21-32.

Gormely, P. J. (1995). "The Human Development Index in 1994: Impact of Income on Country Rank," *Journal of Economic and Social Measurement*, Vol. 21: 253–67.

Hess, P. (1989). "The Military Burden, Economic Growth, and the Human Suffering Index: Evidence from the LDCs," *Cambridge Journal of Economics*, Vol. 13: 497–515.

Hicks, D.A. (1997). "The Inequality Adjusted Human Development Index: A Constructive Proposal," *World Development*, Vol. 25(8): 1283–1298.

Hicks, N. and Streeten, P. (1979). "Indicators of Development: The Search for a Basic Needs Yardstick," *World Development*, Vol. 7: 567–580.

Hopkins, M. (1991). "Human Development Revisited: A New UNDP Report," *World Development*, Vol. 19(10): 1469–1474.

Ivanova, I.F.J. Arcelus, and Srinivasan, G. (1998). "An Assessment of the Measurement Properties of the Human Development Index," *Social Indicators Research*, Vol. 46: 157–179.

Kelley, A.C. (1991). "The Human Development Index: "Handle with Care"," *Population and Development Review*, Vol. 17(2): 315–324.

Larson, D.A. and Wilford, W.T. (1979). "The Physical Quality of Life Index: A Useful Social Indicator?," *World Development*, Vol. 7(7): 581–584.

Lüchters G. and Menkhoff, L. (1996). "Human Development as a Statistical Artifact," *World Development*, Vol. 24(8): 1385–92.

Lüchters G. and Menkhoff, L. (2000). "Chaotic Signs from HDI Measurement," *Applied Economics Letters*, Vol. 7(4): 267–270.

McGillivray, M. (1991). "The Human Development Index: Yet Another Redundant Composite Development Indicator?," *World Development*, Vol. 19(10): 1461–1468.

McGillivray, M. and Noorbakhsh, F. (2004). "Composite Indices of Human Well-being." *WIDER Research Paper No. 2004/63.* Helsinki: WIDER.

McGillivray, M. and White, H. (1992). "Measuring Development? A Statistical Critique of the Human Development Index." *Institute of Social Studies Working Paper No. 135.* The Hague: Institute of Social Studies.

McGillivray, M. and White, H. (1993). "Measuring Development? The UNDP's Human Development Index," *Journal of International Development*, Vol. 5(2): 183–92.

McGillivray, M. and White, H. (1994). "Inter-country Quality of Life Comparison: Does Measurement Error Really Matter?," *Asian Journal of Economics and Social Studies*, Vol. 13(1): 1–13.

McGranahan, D.V., Richard-Proust, C., Sovani, N. V. and Subramanian, V. (1972). *Contents and Measurement of Socioeconomic Development.* A Staff Study of the United Nations Research Institute for Social Development. New York: Praeger.

Morris, M.D. (1979). *Measuring the Conditions of the World's Poor: The Physical Quality of Life Index.* New York: Pergamon.

Morse, S. (2003). "For Better or for Worse, till the Human Development Index do us Part?" *Ecological Economics,* Vol. 45: 281-196.

Murray, C. J. L. (1991). "Development Data Constraints and the Human Development Index." *Discussion Paper 25.* Geneva: UNRISD.

Neumayer, E. (2001). "The Human Development Index and Sustainability – A Constructive Proposal," *Ecological Economics,* Vol. 39: 101–114.

Neumayer, E. (2004). "Sustainability and Well-being Indicators." *WIDER Research Paper No. 2004/23.* Helsinki: Wider.

Noorbakhsh, F. (1998a). "A Modified Human Development Index," *World Development,* Vol. 26(3): 517–28.

Noorbakhsh, F. (1998b). "A Human Development Index: Some Technical Issues and Alternative Indices," *Journal of International Development,* 10: 589–605.

Noorbakhsh, F. (2002). "Human Development and Regional Disparities in Iran: A Policy Model," *Journal of International Development,* Vol. 14: 927–949.

Sagar, A. and A. Najam (1998). "The Human Development Index: A Critical Review," *Ecological Economics,* Vol. 25: 249–264.

Sen, A. K. (1985). *Commodities and Capabilities,* Elsevier, Amsterdam.

Sen, A. K. (1990). "Development as Capability Expansion." In Griffin, K. and Knight, J.(eds), *Human Development and the International Development Strategy for the 1990s.* London: Macmillan: 41-58.

Sen, A.K. (1993). "Capability and Well-being." In Sen, A. and Nussbaum, M.C. (eds), *The Quality of Life.* Oxford: Clarendon Press.

Streeten, P. (1995). "Human Development: The Debate about the Index," *International Social Science Journal,* No. 143: 25–37.

Tilak, J.B.G. (1992). "From Economic Growth to Human Development: A Commentary on Recent Indexes of Development," *International Journal of Social Economics,* Vol. 19(2): 31–42.

United Nations Development Programme (UNDP) (1990–2005). *Human Development Report.* New York: Oxford University Press.

United Nations Research Institute for Social Development (UNRISD) (1970). *Contents and Measurements of Socioeconomic Development.* Geneva: UNRISD.

Veenhoven, R. (1996). "Happy Life Expectancy: A Comprehensive Measure of the Quality-of-Life in Nations," *Social Indicators Research,* Vol. 39: 1–58.

Appendix 1
Human Development Index Data

HDI Rank	Country	HDI Value 2003	Life Expectancy at Birth (years) 2003	Adult Literacy (%) 2003	Combined Gross School Enrolment Ratio(%) 2003	GDP Per Capita (PPP US$) 2003	Life Expectancy Index	Education Index	GDP Index	Per Capita Rank Minus HDI Rank
	Small Island Developing States									
25	Singapore	0.907	78.7	92.5	87	24,481	0.89	0.91	0.92	-4
31	Barbados	0.878	75.0	99.7	89	15,720	0.83	0.96	0.84	9
32	Malta	0.867	78.4	87.9	79	17,633	0.89	0.85	0.86	3
49	St Kitts and Nevis	0.834	70.0	97.8	89	12,404	0.75	0.95	0.80	-4
50	Bahamas	0.832	69.7	95.5	77	17,159	0.75	0.89	0.86	-13
51	Seychelles	0.821	72.7	91.9	85	10,232	0.80	0.89	0.77	5
52	Cuba	0.817	77.3	96.9	80	5400	0.87	0.91	0.67	40
54	Tonga	0.810	72.2	98.9	83	6,992	0.79	0.93	0.71	17
57	Trinidad & Tobago	0.801	69.9	98.5	66	10,766	0.75	0.88	0.78	-6
60	Antigua & Barbuda	0.797	73.9	85.8	69	10,294	0.82	0.80	0.77	-7
65	Mauritius	0.791	72.2	84.3	71	11,287	0.79	0.80	0.79	-16
66	Grenada	0.787	65.3	96.0	96	7,959	0.67	0.96	0.73	-3
70	Dominica	0.783	75.6	88.0	75	5,448	0.84	0.84	0.67	21
74	Samoa (Western)	0.776	70.2	98.7	71	5,854	0.75	0.89	0.68	14
76	St Lucia	0.772	72.4	90.1	75	5,709	0.79	0.85	0.68	13
86	Suriname	0.755	69.1	88.0	73	6552	0.74	0.83	0.70	-7
87	St Vincent & the Grenadines	0.755	71.1	88.1	67	6,123	0.77	0.81	0.69	-5
91	Belize	0.753	71.9	76.9	77	6,950	0.78	0.77	0.71	-19
92	Fiji	0.752	67.8	92.9	73	5,880	0.71	0.86	0.68	-5
95	Dominican Republic	0.749	67.2	87.7	76	6,823	0.70	0.84	0.70	-21
96	Maldives	0.745	66.6	97.2	75	4798	0.69	0.90	0.65	2
98	Jamaica	0.738	70.8	87.6	74	4,104	0.76	0.83	0.62	9

Continued next page

Appendix 1 (Continued)
Human Development Index Data

HDI Rank	Country	HDI Value 2003	Life Expectancy at Birth (years) 2003	Adult Literacy (%) 2003	Combined Gross School Enrolment Ratio(%) 2003	GDP Per Capita (PPP US$) 2003	Life Expectancy Index	Education Index	GDP Index	Per Capita Rank Minus HDI Rank
105	Cape Verde	0.721	70.4	75.7	73	5,214	0.76	0.75	0.66	-11
107	Guyana	0.720	63.1	96.5	77	4,230	0.63	0.90	0.63	-2
118	Vanuatu	0.659	68.6	74.0	58	2,944	0.73	0.69	0.56	-1
126	São Tomé & Principe	0.604	63.0	83.1	62	1,231	0.63	0.76	0.42	27
128	Solomon Islands	0.594	62.3	76.6	52	1,753	0.62	0.68	0.48	13
132	Comoros	0.547	63.2	56.2	47	1,714	0.64	0.53	0.47	13
137	Papua New Guinea	0.523	55.3	57.3	41	2,619	0.50	0.52	0.55	-17
140	Timor-Leste	0.513	55.5	58.6	75	1050	0.51	0.64	0.39	22
153	Haiti	0.475	51.6	51.9	48	1,742	0.44	0.50	0.48	-9
172	Guinea-Bissau	0.348	44.7	39.6	37	711	0.33	0.39	0.33	-1
				Other Countries						
1	Norway	0.963	79.4	99.0	101	37,670	0.91	0.99	0.99	2
2	Iceland	0.956	80.7	99.0	96	31,243	0.93	0.98	0.96	4
3	Australia	0.955	80.3	99.0	116	29,632	0.92	0.99	0.95	7
4	Luxembourg	0.949	78.5	99.0	88	62,298	0.89	0.95	1.00	-3
5	Canada	0.949	80.0	99.0	94	30,677	0.92	0.97	0.96	2
173	**Chad**	**0.341**	**43.6**	**25.5**	**38**	**1,210**	**0.31**	**0.30**	**0.42**	**-19**
174	**Mali**	**0.333**	**47.9**	**19.0**	**32**	**994**	**0.38**	**0.23**	**0.38**	**-10**
175	**Burkina Faso**	**0.317**	**47.5**	**12.8**	**24**	**1,174**	**0.38**	**0.16**	**0.41**	**-20**
176	**Sierra Leone**	**0.298**	**40.8**	**29.6**	**45**	**548**	**0.26**	**0.35**	**0.28**	**1**
177	**Niger**	**0.281**	**44.4**	**14.4**	**21**	**835**	**0.32**	**0.17**	**0.35**	**-8**

Source: UNDP (2005)

Note that some data are estimates. See UNDP (2005: 222) for details.